

## **SECTION 07841 - THROUGH-PENETRATION FIRE-STOP SYSTEMS**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### **1.2 SUMMARY**

- A. This Section includes through-penetration fire-stop systems for penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items.
- B. Related Sections include the following:
  - 1. Division 7 Section "Fire-Resistive Joint Systems."
  - 2. Division 13 Sections specifying fire-suppression piping penetrations.
  - 3. Division 15 Sections specifying duct and piping penetrations.
  - 4. Division 16 Sections specifying cable and conduit penetrations.

#### **1.3 PERFORMANCE REQUIREMENTS**

- A. General: For penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration fire-stop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.
  - 1. Fire-resistance-rated walls including firewalls, fire partitions, fire barriers, and smoke barriers.
  - 2. Fire-resistance-rated horizontal assemblies including floors.
- B. Rated Systems: Provide through-penetration fire-stop systems with the following ratings determined per ASTM E 814:
  - 1. F-Rated Systems: Provide through-penetration fire-stop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
  - 2. T-Rated Systems: For the following conditions, provide through-penetration fire-stop systems with T-ratings indicated, as well as F-ratings, where systems protect penetrating items exposed to potential contact with adjacent materials in occupied floor areas:
    - a. Penetrations located outside wall cavities.
    - b. Penetrations located outside fire-resistance-rated shaft enclosures.
  - 3. L-Rated Systems: Where through-penetration fire-stop systems are indicated in smoke-barriers, provide through-penetration fire-stop systems with L-ratings of not more than 3.0 cfm/sq. ft (0.01524cu. m/s x sq. m) at both ambient temperatures and 400 deg F (204 deg C).

- C. For through-penetration fire-stop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.
  - 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration fire-stop systems.
  - 2. For floor penetrations with annular spaces exceeding 4 inches (100 mm) in width and exposed to possible loading and traffic, provide fire-stop systems capable of supporting floor loads involved, either by installing floor plates or by other means.
  - 3. For penetrations involving insulated piping, provide through-penetration fire-stop systems not requiring removal of insulation.
- D. For through-penetration fire-stop systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For each through-penetration fire-stop system, show each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item. Include fire-stop design designation of qualified testing and inspecting agency that evidences compliance with requirements for each condition indicated.
  - 1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration fire-stop system configuration for construction and penetrating items.
- C. Through-Penetration Fire-stop System Schedule: Indicate locations of each through-penetration fire-stop system, along with the following information:
  - 1. Types of penetrating items.
  - 2. Types of constructions penetrated, including fire-resistance ratings and, where applicable, thickness of construction penetrated.
  - 3. Through-penetration fire-stop systems for each location identified by fire-stop design designation of qualified testing and inspecting agency.
- D. Qualification Data: For Installer.
- E. Product Certificates: For through-penetration fire-stop system products, signed by product manufacturer indicating compliance with requirements base on comprehensive testing of current products by a qualified testing agency.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A firm experienced in installing through-penetration fire-stop systems similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its through-penetration fire-stop system products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

- B. Source Limitations: Obtain through-penetration fire-stop systems, for each kind of penetration and construction condition indicated, through one source from a single manufacturer.
- C. Fire-Test-Response Characteristics: Provide through-penetration fire-stop systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:
  - 1. Through-penetration fire-stop systems are identical to those tested per testing standard referenced in "Part 1 Performance Requirements" Article. Provide rated systems complying with the following requirements:
    - a. Through-penetration fire-stop system products bear classification marking of qualified testing and inspecting agency.
    - b. Through-penetration fire-stop systems correspond to those indicated by reference to through-penetration fire-stop system designations listed by the following:
      - 1) UL in its "Fire Resistance Directory."
- D. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver through-penetration fire-stop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life if applicable, qualified testing and inspecting agency's classification marking applicable to Project, curing time, and mixing instructions for multi-component materials.
- B. Store and handle materials for through-penetration fire-stop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

#### 1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install through-penetration fire-stop systems when ambient or substrate temperatures are outside limits permitted by through-penetration fire-stop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate through-penetration fire-stop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

#### 1.8 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that through-penetration fire-stop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration fire-stop systems.
- C. Do not cover up through-penetration fire-stop system installations that will become concealed behind other construction until each installation has been examined by Owner's inspector.

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## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, through-penetration fire-stop systems that may be incorporated into the Work include, but are not limited to, those systems indicated in the Through-Penetration Fire-stop System Schedule that are produced by one of the following manufacturers:
1. A/D Fire Protection Systems Inc.
  2. Grace, W. R. & Co. - Conn.
  3. Hilti, Inc.
  4. Johns Manville.
  5. Specified Technologies Inc.
  6. 3M; Fire Protection Products Division.
  7. USG Corporation.

### 2.2 FIRE-STOPPING, GENERAL

- A. Compatibility: Provide through-penetration fire-stop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration fire-stop systems, under conditions of service and application, as demonstrated by through-penetration fire-stop system manufacturer based on testing and field experience.
- B. Accessories: Provide components for each through-penetration fire-stop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by through-penetration fire-stop system manufacturer and approved by qualified testing and inspecting agency for fire-stop systems indicated. Accessories include, but are not limited to, the following items:
1. Permanent forming/damming/backing materials, including the following:
    - a. Slag-/rock-wool-fiber insulation.
    - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
    - c. Fire-rated form board.
    - d. Fillers for sealants.
  2. Temporary forming materials.
  3. Substrate primers.
  4. Collars.
  5. Steel sleeves.

### 2.3 FILL MATERIALS

- A. General: Provide through-penetration fire-stop systems containing the types of fill materials indicated in the Through-Penetration Fire-stop System Schedule at the end of Part 3 by referencing the types of materials described in this Article. Fill materials are those referred to in directories of referenced testing and inspecting agencies as "fill," "void," or "cavity" materials.
- B. Cast-in-Place Fire-stop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

- C. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.
- D. Fire-stop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- E. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.
- F. Intumescent Putties: Non-hardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- G. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- H. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a non-shrinking, homogeneous mortar.
- I. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives.
- J. Silicone Foams: Multi-component, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, non-shrinking foam.
- K. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
  - 1. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.
  - 2. Grade for Vertical Surfaces: Non-sag formulation for openings in vertical and other surfaces.

## 2.4 MIXING

- A. For those products requiring mixing before application, comply with through-penetration fire-stop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of work.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing through-penetration fire-stop systems to comply with fire-stop system manufacturer's written instructions and with the following requirements:
  - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration fire-stop systems.
  - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration fire-stop systems. Remove loose particles remaining from cleaning operation.
  - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by through-penetration fire-stop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent through-penetration fire-stop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from fire-stop system materials. Remove tape as soon as possible without disturbing fire-stop system's seal with substrates.

### 3.3 THROUGH-PENETRATION FIRE-STOP SYSTEM INSTALLATION

- A. General: Install through-penetration fire-stop systems to comply with Part 1 "Performance Requirements" Article and with fire-stop system manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
  - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-stop systems.
- C. Install fill materials for fire-stop systems by proven techniques to produce the following results:
  - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required achieving fire-resistance ratings indicated.
  - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
  - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### 3.4 IDENTIFICATION

- A. Identify through-penetration fire-stop systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of edge of the fire-stop systems so that labels will be visible to anyone seeking to remove penetrating items or fire-stop systems. Use mechanical fasteners for metal labels. For plastic labels, use self-adhering type with adhesives capable of permanently bonding labels to surfaces on which labels are placed and, in combination with label material, will result in partial destruction of label if removal is attempted. Include the following information on labels:

1. The words "Warning - Through-Penetration Fire-stop System - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Through-penetration fire-stop system designation of applicable testing and inspecting agency.
4. Date of installation.
5. Through-penetration fire-stop system manufacturer's name.
6. Installer's name.

### 3.5 FIELD QUALITY CONTROL

- A. Inspector: Owner will inspect through-penetration fire-stops.
- B. Where deficiencies are found, repair or replace through-penetration fire-stop systems so they comply with requirements.
- C. Proceed with enclosing through-penetration fire-stop systems with other construction only after inspection reports are issued and fire-stop installations comply with requirements.

### 3.6 CLEANING AND PROTECTING

- A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration fire-stop system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that through-penetration fire-stop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration fire-stop systems immediately and install new materials to produce systems complying with specified requirements.

### 3.7 THROUGH-PENETRATION FIRE-STOP SYSTEM SCHEDULE

- A. Where UL-classified systems are indicated, they refer to alpha-alpha-numeric designations listed in UL's "Fire Resistance Directory" under product Category XHEZ.
- B. Fire-stop Systems with No Penetrating Items:
  1. Available UL-Classified Systems: C-AJ-0001-0999.
  2. Type of Fill Materials:
    - a. Intumescent putty.
- C. Fire-stop Systems for Metallic Pipes, Conduit, or Tubing:
  1. Available UL-Classified Systems: C-AJ-1001-1999.
  2. Type of Fill Materials:
    - a. Intumescent putty.
- D. Fire-stop Systems for Nonmetallic Pipe, Conduit, or Tubing:
  1. Available UL-Classified Systems: C-AJ-2001-2999.
  2. Type of Fill Materials: One or more of the following:
    - a. Intumescent putty.
    - b. Intumescent wrap strips.

- c. Fire-stop device.
- E. Fire-stop Systems for Electrical Cables:
  - 1. Available UL-Classified Systems: C-AJ-3001-3999.
  - 2. Type of Fill Materials: One or more of the following:
    - a. Intumescent putty.
    - b. Silicone foam.
    - c. Pillows/bags.
- F. Fire-stop Systems for Cable Trays:
  - 1. Available UL-Classified Systems: C-AJ-4001-4999.
  - 2. Type of Fill Materials: One or more of the following:
    - a. Intumescent putty.
    - b. Silicone foam.
    - c. Pillows/bags.
- G. Fire-stop Systems for Insulated Pipes:
  - 1. Available UL-Classified Systems: C-AJ-5001-5999.
  - 2. Type of Fill Materials: One or more of the following:
    - a. Intumescent putty.
    - b. Silicone foam.
    - c. Intumescent wrap strips.
- H. Fire-stop Systems for Miscellaneous Electrical Penetrations:
  - 1. Available UL-Classified Systems: C-AJ-6001-6999.
  - 2. Type of Fill Materials:
    - a. Intumescent putty.
- I. Fire-stop Systems for Miscellaneous Mechanical Penetrations:
  - 1. Available UL-Classified Systems: C-AJ-7001-7999.
  - 2. Type of Fill Materials:
    - a. Latex sealant.
- J. Fire-stop Systems for Groupings of Penetrations:
  - 1. Available UL-Classified Systems: C-AJ-8001-8999.
  - 2. Type of Fill Materials: One or more of the following:
    - a. Intumescent wrap strips.
    - b. Fire-stop device.
    - c. Intumescent composite sheet.

END OF SECTION 07841